

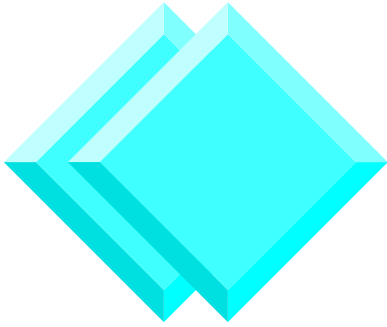


***Report on 1996  
Open System Architecture  
Studies  
for the  
Open Systems Joint Task Force***

***30-April-1998***

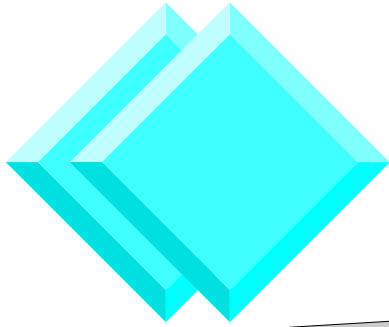
***Harris Corporation  
for OS-JTF and Air Force Research Laboratory***



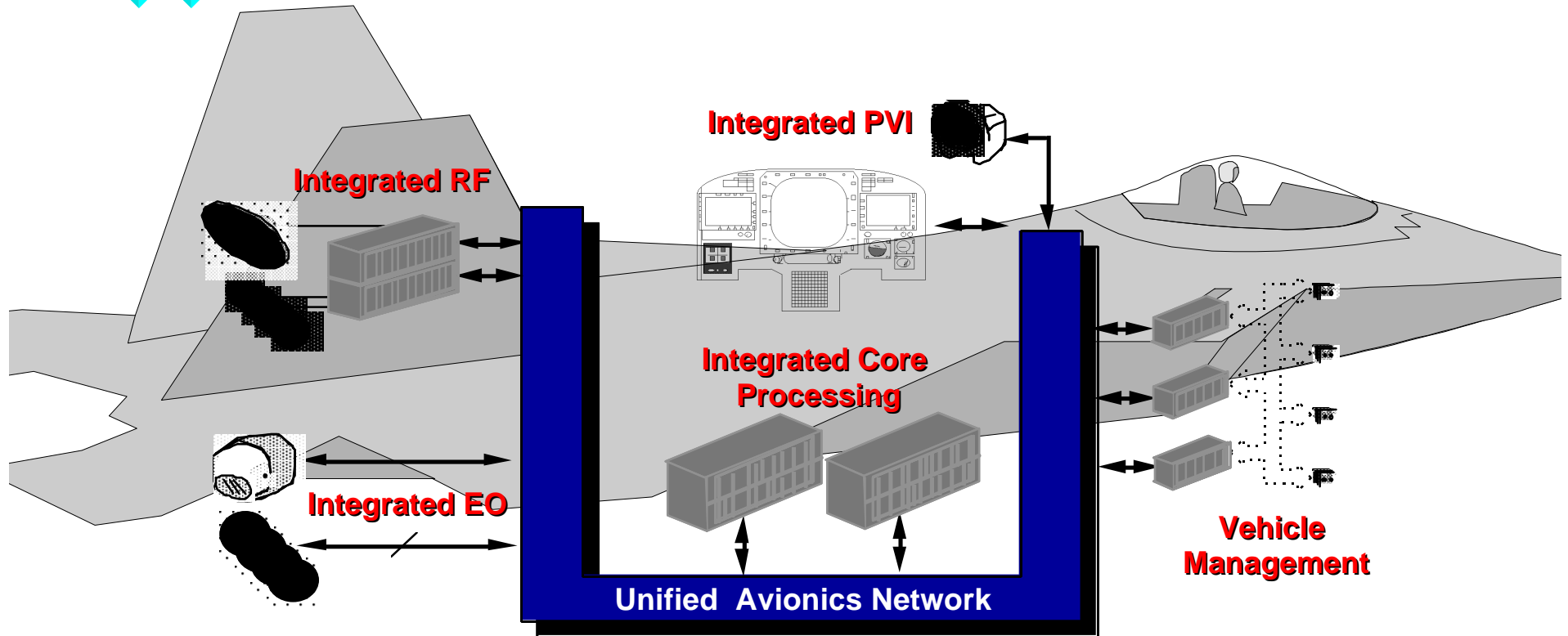


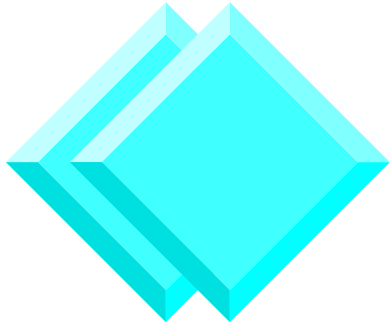
## ***Outline of Presentation***

- ❖ ***Vision: Unified Network***
- ❖ ***OSA Study Tasks — 1996 Efforts***
- ❖ ***Our View of GOA Model***
- ❖ ***Lessons Learned***
- ❖ ***Closing Observations***



# ***Vision: Unified Avionics Network***





# ***OSA Study Tasks — 1996 Efforts***

## **❖ *Task 1: Network Requirements***

- ◆ Harris shall work with the government and JSF Weapon System Concept (WSC) contractors to develop requirements for the JSF core processing networks

## **❖ *Task 2: Network Survey***

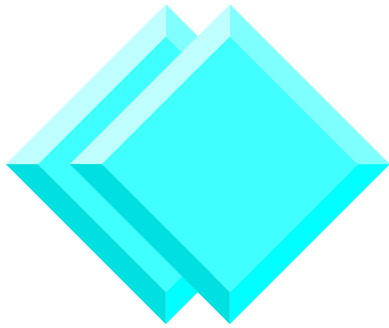
- ◆ Harris shall investigate and review networks — available in the commercial and military marketplace — for applicability to JSF core processing networks

## **❖ *Task 3: Trade Studies***

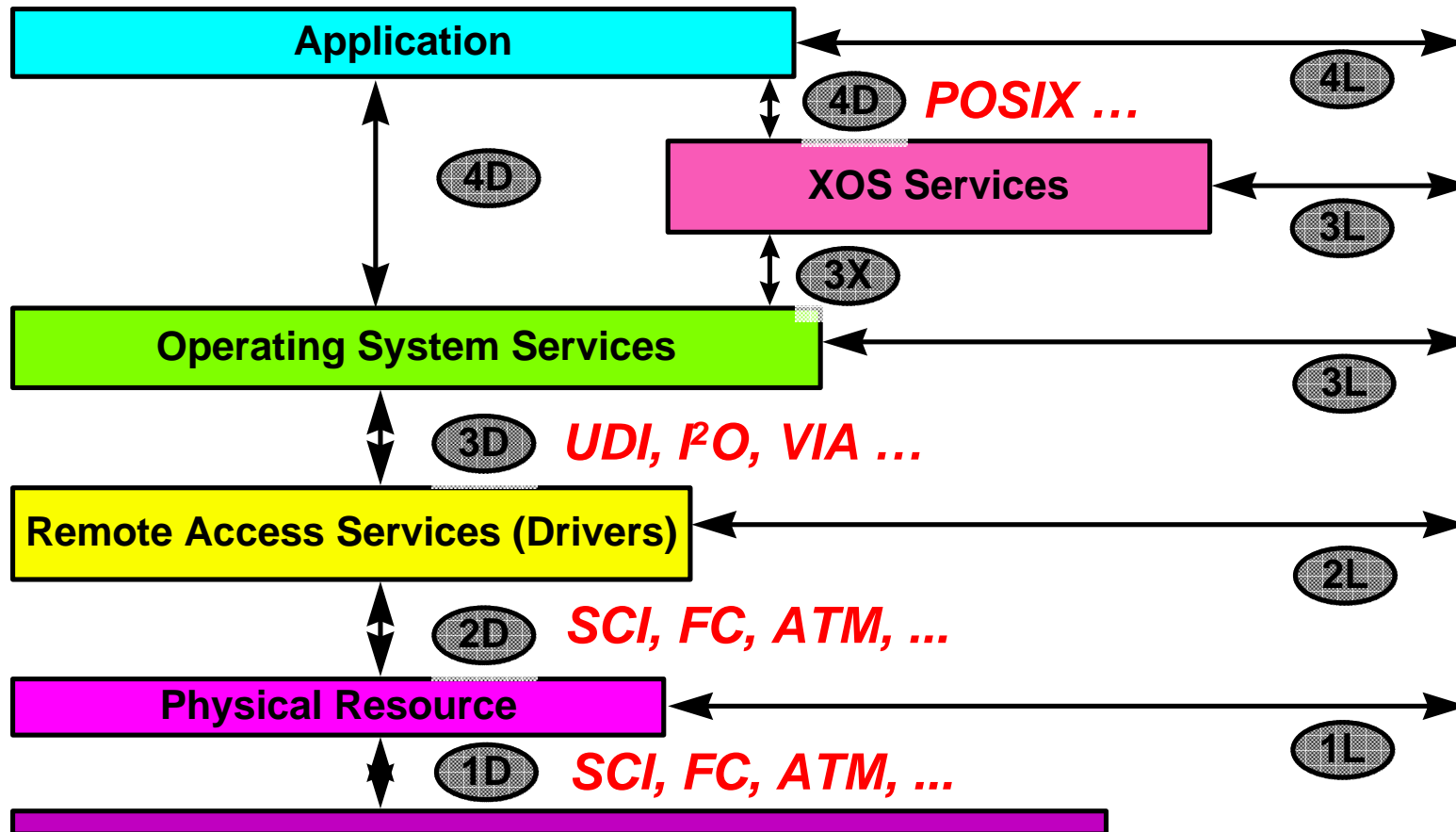
- ◆ Harris shall use the results of Tasks 1 and 2 to perform a series of trade studies addressing applicability to JSF

## **❖ *Task 4: Recommendations***

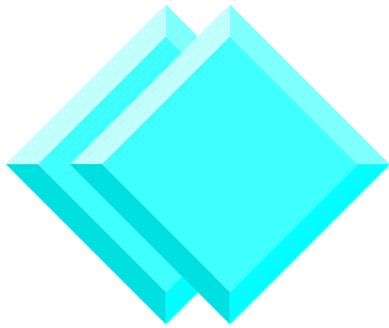
- ◆ Harris shall provide recommendations for an optimized network for the JSF avionics architecture



## Our View of GOA<sup>†</sup> Model

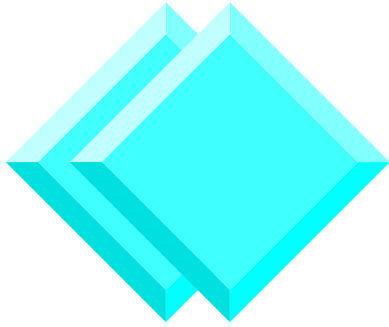


<sup>†</sup>GOA Model: Generic Open Architecture Model, ref. SAE AS4893



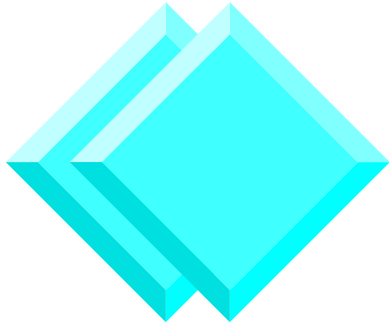
## ***Lessons Learned ... Situation in 1996 ...***

	ATM	Fibre Channel Family		SCI Family	
		ANSI X3T11,	IEEE 802.3z,	IEEE 1596	IEEE P1394.2
		Fibre Channel	Gigabit Ethernet	SCI	Serial Express
Commercial Acceptance	Excellent	Very Good	Good and Growing	Fair	Fair
Standardization Complete	No	Partially	No	Yes	No
Optimized for Streaming Transfers (for Sensor Data)	~	Yes	~	No	Yes
Optimized for Low-Latency Memory Transactions (for High Performance Multiprocessing)	~	No	No	Yes	Yes



## ***Lessons Learned: Market Research***

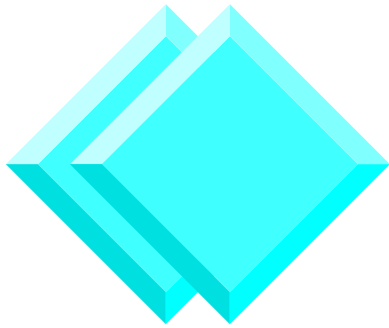
- ❖ **Each emerging standard has a *trade association***
  - Typically, these associations evangelistically project exponential growth for their standard
- ❖ **Independent *market research providers* avoid providing definitive projections about a standard's future**
- ❖ **For *emerging standards*, there is often little correlation between the projections of market research firms and trade associations**
- ❖ **Established market researchers will provide fairly specific, quantitative, information about *mature technology products***
  - *Mature* may mean as little as *one year old* in this arena.



## ***Market Classifier: System Diameter***

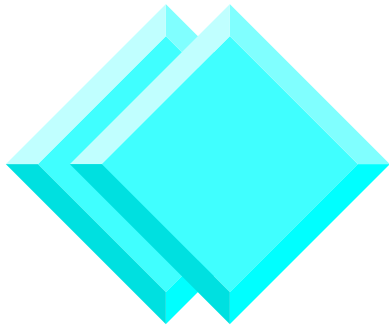
- ❖ **The *most prominent market classifier* between digital communication systems is system extent, what we call *system diameter***
  - ◆ At the larger system diameters — say, greater than ten meters — one finds the generally recognized networks
    - Ethernet, SONET, ATM, and so forth
  - ◆ At smaller system diameters — say, less than one meter — one finds a number of important digital interconnects (often buses)
    - VME, PCI, ISA, etc.
    - Interconnects such as SCSI fall somewhere in between
- ❖ **Acronyms:**
  - SONET: Synchronous Optical Network
  - ATM: Asynchronous Transfer Mode
  - PCI: Peripheral Component Interconnect
  - ISA: Industry Standard Architecture
  - SCSI: Small Computer System Interface





## ***Market Observations for Digital Interconnects***

<i><b>Mnemonic</b></i>	<i><b>Name</b></i>	<i><b>Typical System Diameter</b></i>	<i><b>Leaders</b></i>	<i><b>Contenders, Most Still Emerging</b></i>
<b>CAN</b>	Chip Area Network	Millimeters	Not Applicable, Generally Proprietary	Pre-emergent standards for chip-level intellectual property sharing
<b>BAN</b>	Backplane Area Network	Up to ~0.5 Meters	VME, PCI, ISA	Futurebus+
<b>DAN</b>	Desktop Area Network	~0 to 3 Meters	RS-232, SCSI	IEEE 1394 Serialbus, Fibre Channel, Serial Express
<b>SAN</b>	System Area Network	~0 to 30 Meters	None, Emerging Market	Fibre Channel, Myrinet™, SCI, Serial Express, Proprietary Projects
<b>LAN</b>	Local Area Network	10 to 100 Meters	10 Mbit and 100 Mbit Ethernet	Gigabit Ethernet, ATM
<b>WAN</b>	Wide Area Network	0.5 km and up	Various	ATM over SONET



## ***Closing Observations***

- ❖ ***Technology obsolescence*** is the biggest challenge to successful long-term use of open systems in advanced avionics
  - ◆ A network with good/growing commercial support today may not enjoy commercial support over the life of the aircraft
- ❖ ***All*** of the standards/standardization projects discussed ***have the potential*** to form the basis of a useful network for next-generation avionics
- ❖ Selecting an optimum protocol for an application platform requires detailed knowledge of its ***Concepts of Operation (CONOPS)***
  - ◆ The platform primes typically view this information to be competition sensitive during the early competition phase